LIFE E-VIA

Electric **V**ehicle no**I**se control by **A**ssessment and optimisation of tyre/ road interaction

Dissemination and participation photo album

By Vie en.ro.se. Ingegneria

With the contribution of the LIFE programme of the European Union

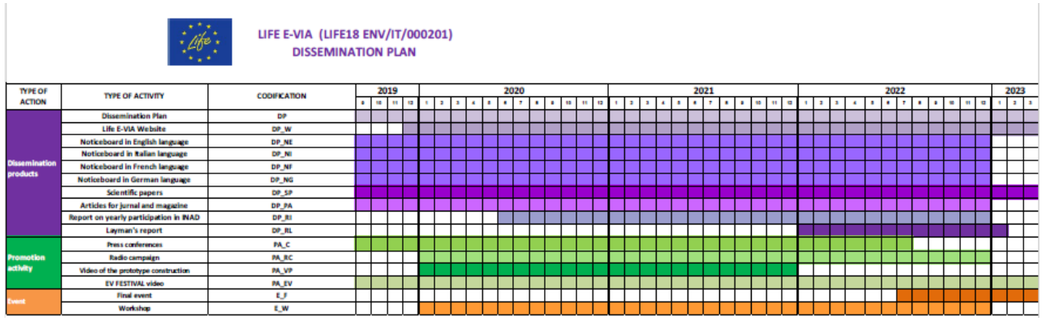
LIFE18 ENV/IT/000201

Kick off meeting of partners

Issued on: September 2019

By: All partners

MEETING



Vie en.ro.se.
Ingegneria

Action D1 – Proposals for the Project's logo overview

1 2 3 4

EUROCITIES- Meeting in Oslo during the Environment Forum

Issued on: October 2019

By: Comune di Firenze and Vie en.ro.se. Ingegneria

MEETINGS OF THE EUROCITIES

Code: E_1

« E-VIA » Electric Vehicle noise control by Assessment and optimisation of Tyre/road interaction

PROJECT LOCATION: Florence Italy

BUDGET INFO:

Total amount: 1.797,030 €

55% EC Co-funding: 933,295 €

DURATION: Start: 01/07/2019 - End: 31/01/2023

PROJECT'S IMPLEMENTORS:

Coordinating Beneficiary: Florence Municipality

Associated Beneficiary(ies):

Continental Reifen Deutschland
Ifsttar
Ipool S.r.l.
University of Reggio Calabria
Vie en.ro.se Ingegneria S.r.l

Eurocities Environment Forum
Oslo 23-25 Ottobre 2019

Arnaldo Melloni
Project Manager

LIFE 18 ENV and GIE Welcome meeting in Brussels

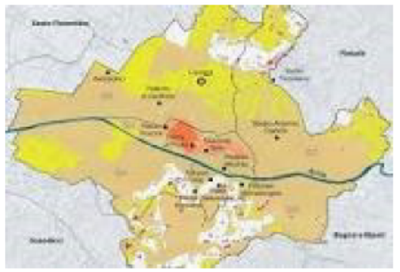
Issued on: November 2019

By: Comune di Firenze

MEETING

« E-VIA » Electric Vehicle noise control by Assessment and optimisation of Tyre/road interaction

PROJECT LOCATION: Florence Italy



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Ifsttar
Ipool S.r.l.
University of Reggio Calabria
Vie en.ro.se Ingegneria S.r.l

LIFE18 ENV and GIE Welcome Meeting, Brussels, 7-8 November 2019

Arnaldo Melloni
Project Manager

Development and launch of LIFE E-VIA website

Issued on: December 2019

By: Vie en.ro.se. Ingegneria

Deadline: 01/12/2019

LIFE E-VIA WEBSITE

Code: 3

https://life-evia.eu/

SC4Life- SmartCity 360°
Scientific Contribution

Issued on: December 2019

By: UNIRC

Deadline: 31/03/2023

SCIENTIFIC PAPERS
Code: 36_1

http://sc4life.org/full-program/

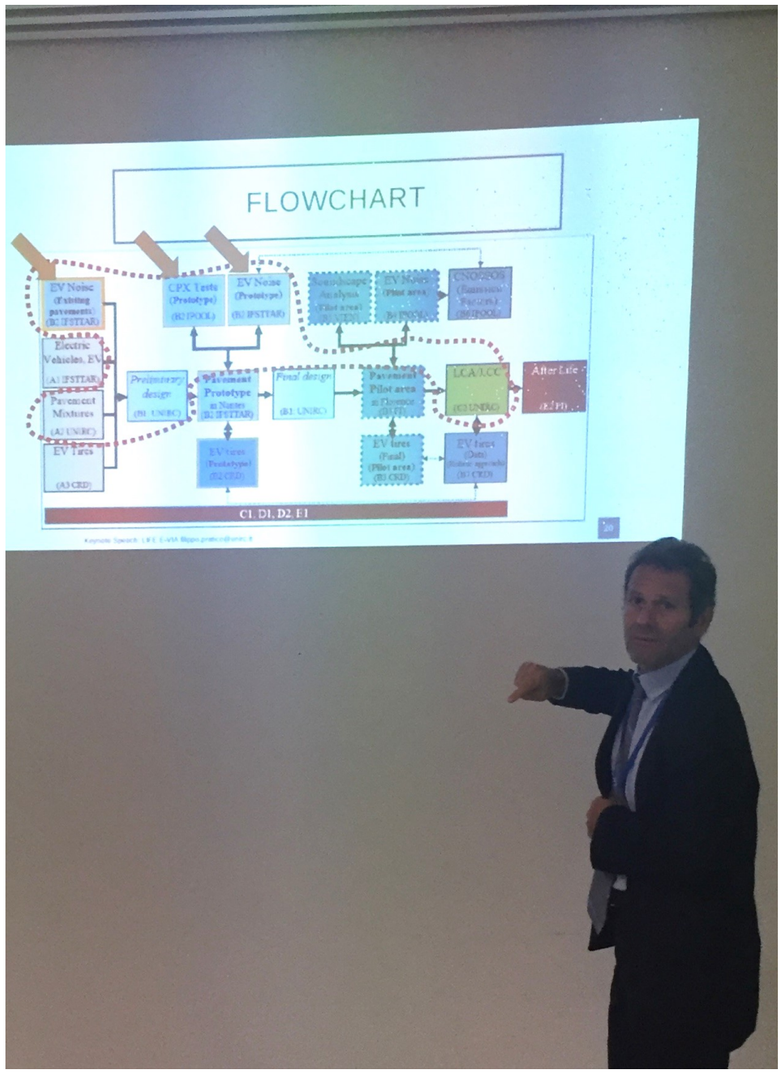
HOME REGISTRATION COMMITTEES PROGRAM FOR AUTHORS CALLS PRACTICAL INFO SPONSORSHIP SMARTCITY 360°

SESSION 1: Cities and Territory

Session Chair: Paulo Pereira

Keynote Speech: Fillipo Pràtico

Title: *LIFE E-VIA: Electric Vehicle noise control by assessment and optimisation of tyre/road interaction*



SC4Life conference will take place on the 5th December in the room #3
11:30 – 13:00 SESSION 1: Cities and Territory
Session Chair: Paulo Pereira

Keynote Speech
The LIFE E-VIA project

Electric Vehicle noise control by assessment and optimisation of tyre/road interaction
(LIFE18 ENV/IT/000201)

http://life-evia.eu http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=7210

Filippo Giammaria Praticò,
University Mediterranea of Reggio Calabria; Italy
filippo.pratico@unirc.it

Paper published on Sustainability 2020 about the sustainable pavement materials for the urban roads.

Issued on: January 2020

By: UNIRC

Deadline: 01/12/2022

ARTICLES FOR OPEN ACCESS JOURNAL

Code: 20_1

https://www.mdpi.com/2071-1050/12/2/704/htm/

sustainability

MDPI

Article

Energy and Environmental Life Cycle Assessment of Sustainable Pavement Materials and Technologies for Urban Roads

Filippo G. Praticò [1], Marinella Giunta [2,*], Marina Mistretta [3] and Teresa Maria Gulotta [4]

1 Department of Information, Infrastructure and Sustainable Energy (DIIES), Via Graziella, Feo di Vito, University Mediterranea of Reggio Calabria, 89214 Reggio Calabria, Italy; filippo.pratico@unirc.it

2 Department of Civil, Energy, Environmental and Material Engineering (DICEAM), via Graziella, Feo di Vito, University Mediterranea of Reggio Calabria, 89100 Reggio Calabria, Italy

3 Department of Heritage, Architecture, Urbanism (PAU), Via dell'Università, 25, University Mediterranea of Reggio Calabria, 89124 Reggio Calabria, Italy; marina.mistretta@unirc.it

4 Department of Engineering, Viale delle Scienze, University of Palermo, 90128 Palermo, Italy; teresa.gulotta@deim.unipa.it

* Correspondence: marinella.giunta@unirc.it; Tel.: +39-0965-169-2471

Received: 18 December 2019; Accepted: 16 January 2020; Published: 18 January 2020

check for updates

Abstract: Recycled and low-temperature materials are promising solutions to reduce the environmental burden deriving from hot mix asphalts. Despite this, there is lack of studies focusing on the assessment of the life-cycle impacts of these promising technologies. Consequently, this study deals with the life cycle assessment (LCA) of different classes of pavement technologies, based on the use of bituminous mixes (hot mix asphalt and warm mix asphalt) with recycled materials (reclaimed asphalt pavements, crumb rubber, and waste plastics), in the pursuit of assessing energy and environmental impacts. Analysis is developed based on the ISO 14040 series. Different scenarios of pavement production, construction, and maintenance are assessed and compared to a reference case involving the use of common paving materials. For all the considered scenarios, the influence of each life-cycle phase on the overall impacts is assessed to the purpose of identifying the phases and processes which produce the greatest impacts. Results show that material production involves the highest contribution (about 60–70%) in all the examined impact categories. Further, the combined use of warm mix asphalts and recycled materials in bituminous mixtures entails lower energy consumption and environmental impacts due to a reduction of virgin bitumen and aggregate consumption, which involves a decrease in the consumption of primary energy and raw materials, and reduced impacts for disposal. LCA results demonstrate that this methodology is able to help set up strategies for eco-design in the pavement sector.

all the scenarios. In detail, it accounts for more than 60% of the majority of environmental indicators, with the exception of EF_w, HT-ce, HT-nce, and ME.

The negative values of Ftox and HT-ce in Scenario 1 (addition of waste plastics in the bituminous mixture) are essentially due to the avoided impacts of virgin plastics.

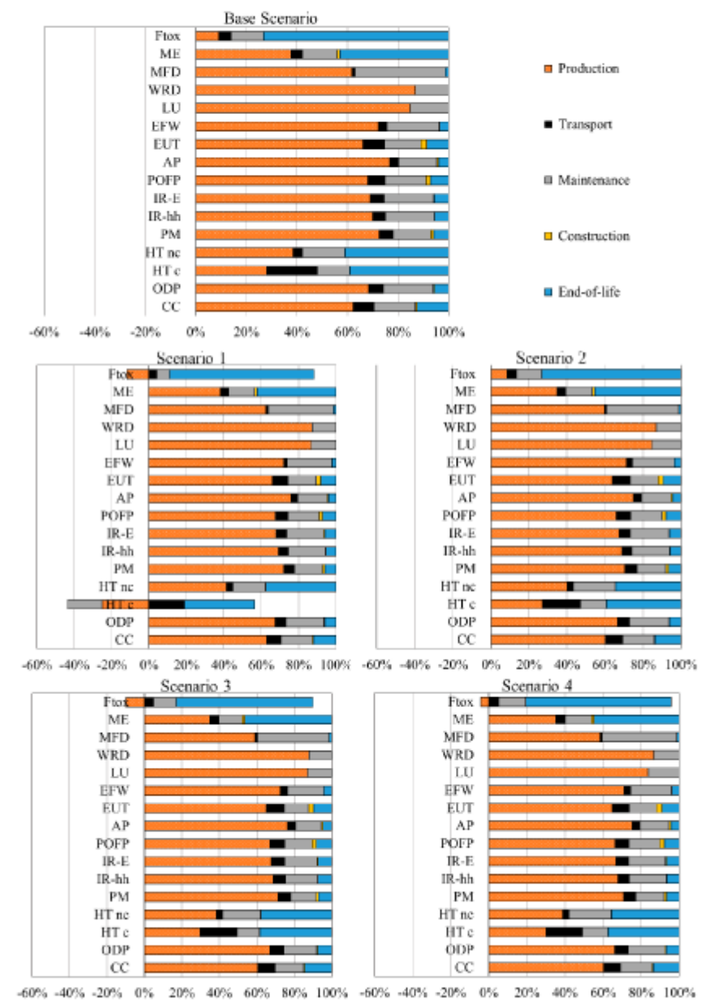


Figure 2. Contribution analysis of life-cycle environmental impacts.

LIFE E-VIA: objectives and actions

Issued on: February 2020

By: : Vie en.ro.se. Ingegneria

Deadline: 01/12/2022

NOTICEBOARD IN ENGLISH LANGUAGE

Code: 18_1

LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000251

Background

Exposure data from the European Environment Agency (EEA) demonstrate that more than 100 million EU citizens are affected by high noise levels negatively impacting human health. Traffic noise alone is harmful to the health of almost every third person in the WHO (World Health Organization) European Region. 20% of Europeans are regularly exposed to night sound levels that could significantly damage health, especially in urban areas. As emerged in Noise in Europe Conference (April 2017) and in the WHO guidelines published in October 2018, the increased stringency of EU at source standards needs to be balanced against other effective measures such as road surface and/or tyre improvements and urban planning measures as well.
One of the solutions universally recognized as the best to reduce noise in urban areas, from both the point of view of noise and air quality, is the introduction of **electric mobility**. Thus, for the changed requirements of Electric Vehicles (EVs) there is a need for in-depth investigations of tyre/road interaction. Last but not least, even for the application of the Directive 2002/49/EC, the coefficients to apply the CNOSSOS model (Directive 996/2015/EC) to new traffic spectra and new vehicles are completely missing.

Objectives

1. To **reduce noise** for roads inside very populated urban areas through the implementation of a mitigation measure aimed at **optimizing road surfaces and tyres of EVs**. Two road surfaces, at least 5 different EV types, one reference ICE Vehicle (ICEV) and at least 3 types of tyres per vehicle type (including tyres specifically designed for EVs) will be tested
2. To **estimate the mitigation efficiency** and **potential of tyres, pavements** and **traffic** (traffic spectrum, speeds, handling conditions) at a higher and comprehensive level: a Life Cycle Analysis (LCA) and a Life Cycle Cost Analysis (LCCA) will be performed to demonstrate the individual and synergistic efficiency of pavement surfaces, tyres and vehicles (including the comparison between internal combustion vehicles, mixed traffic, and EV traffic)
3. To contribute to **EU legislation effective implementation** (EU Directives 2002/49/EC and 2015/996/EC), providing rolling noise coefficients within the Common Noise Assessment Method (**CNOSSOS-EU**), specifically tuned for EVs which are actually in need of data for practitioners, agencies, and departments aiming at developing future scenarios
4. To contribute to **national and Italian regional policies**, issuing **guidelines** about use and application of the methodology output of the project, which will be adopted, through the Regional Env. Agency (ARPAT), supporting the project, by Tuscany Region. Calabria Region and Città of Reggio Calabria also expressed their interest.
5. To **raise people's awareness** of noise pollution and health effects explaining the opportunities provided by EVs through specific dissemination and promotional events, also investigating people perception regarding noise in terms of soundscape methodology and involving them in noise data acquisition.
6. To demonstrate and **promote sustainable road transport mobility (electric)**, reducing noise emission by 5 dB(A) at receivers' roadside and achieving also CO_2 emissions reduction (21%), based on the Italian context (LPG, CNG, Hybrid, EV, petrol cars, diesel cars) and the concerned literature
7. To **encourage low-noise surfaces implementation in further EU and extra-EU scenarios**, demonstrating durability and sustainability, through in-depth LCA&LCCA

Actions

A. Preparatory actions
A1 Electric vehicles and their noise emission
A2 Quiet pavement technologies and their performance over time
A3 Tyre role in the new context of EV and ICEV

B. Implementation actions
B1 Tracks design
B2 Tyre-pavement coupling study and prototype implementation
B3 Pilot area: Implementation, Replication and transferability
B4 Track efficiency tests in the pilot area
B5 Soundscape analysis
B6 Evaluation of EV noise emissions
B7 Holistic performances of tyres

C. Monitoring of the impact of the project actions
C1 Monitoring of the impact of the project actions
C2 Life cycle analysis (LCA) and life cycle costing (LCC)

D. Public awareness and dissemination of results
D1 Information and awareness raising activities
D2 Technical dissemination activities to stakeholders

E. Project management

Project website: https://life-evia.eu/

Roll-up
Issued on: February 2020
By: : Vie en.ro.se. Ingegneria
Deadline: 01/12/2022

With the contribution of the LIFE programme of the European Union
LIFE18 ENV/IT/000201

NOTICEBOARD IN ENGLISH LANGUAGE
Code: 18_2

LIFE E-VIA

Electric **V**ehicle no**I**se control by
Assessment and optimisation
of tyre/road interaction

Coordinating beneficiary

Partners

Journées Techniques Acoustique et Vibrations

"LIFE E-VIA: noise control of electric vehicles by optimizing tire-road interaction"

Issued on: March 2020

By: : Université Gustave Eiffel

Deadline: 01/03/2023

SCIENTIFIC PRESENTATION IN NATIONAL CONGRESS

Code: 36_2

Journées Techniques
Acoustique et Vibrations
Lille – France – 11-12 mars 2020

JOURNEES TECHNIQUES ACOUSTIQUE ET VIBRATIONS

LIFE E-VIA : contrôle du bruit des véhicules électriques par optimisation de l'interaction pneumatique-chaussée

Julien CESBRON, Marie-Agnès PALLAS, Philippe KLEIN,
Simon BIANCHETTI, Adrien LE BELLEC, Vincent GARY

Université Gustave Eiffel – UMRAE

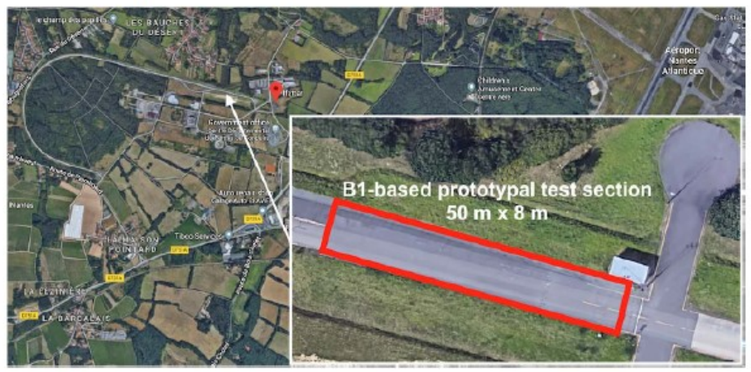
Université Gustave Eiffel Cerema

Action B21 - Acoustical characterization of EVs

- Planned vehicles:
  - One ICE Vehicle (Renault Kangoo Diesel)
  - Several EVs (Renault Kangoo ZE, Renault Zoe, C-Zero, Nissan Leaf, BMW i3, Tesla Model 3)
- Already tested in August 2019:
  - Renault Kangoos (ICEV and EV) and Renault Zoe

Action B22 – Prototype construction

- Construction of a B1-based test track prototype:
  - Located on IFSTTAR reference test track in Nantes
  - Call for tender planned in April 2020 based on B1 recommendations
  - Construction planned in July 2020



11th International Conference "Environmental Engineering"
Vilnius Gediminas Technical University
Lithuania, 21–22 May 2020
Section: Environmental Protection and Water Engineering
http://enviro.vgtu.lt

eISSN 2029-7092 / eISBN 978-609-476-232-1

Article ID: enviro.2020.622
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Particulate Matter from Non-exhaust Sources

Filippo G. Praticò, Paolo G. Briante*

Department of Information Engineering, Infrastructure and Sustainable Energy (DIIES), Mediterranea University, Reggio Calabria, Italy

Received 04 February 2020; accepted 24 March 2020

Abstract. Air pollution is an important issue worldwide. Solid components in air (particulate matter, PM) originate from a variety of natural or anthropogenic sources and have different morphological, physical, and chemical properties. Their presence in the air also depends on meteorological conditions, such as humidity, rainfall, and wind speed. PM pollution has adverse effects on environment and human health. Therefore, it is very important to address sources and processes involved in PM generation. Among the existing sources, a special attention must be paid to PM emissions from road traffic, i.e., exhaust sources (e.g., fuel combustion) and non-exhaust sources (e.g., road, tyre, brakes). These traffic-related sources contribute to PM concentrations in cities, and this calls for research into new possible systems and/or mitigation measures. In light of the facts above, the objectives of this study are 1) To evaluate the contribution to PM emission from traffic-related sources. 2) To evaluate existing mitigation measures and to identify new ones to reduce PM production. First results show that: 1) Non-exhaust sources have a different role in PM generation and they differently affect PM_{10}, $PM_{2.5}$, and $PM_{0.1}$. 2) Even if emissions-related regulations have led to reductions in exhaust emissions from road traffic, other mitigation measures could reduce the non-exhaust part of emissions (e.g., brakes wear, road wear, and tyre wear). 3) New technologies could be developed to reduce PM from non-exhaust sources.

Keywords: particulate matter, non-exhaust sources, tyre wear, road wear, brake wear, mitigation measures.

Paper submitted to 4th International Symposium "NEW METROPOLITAN PERSPECTIVES", Reggio Calabria, Italy.
Issued on: May 2020
By: UNIRC
Deadline: 31/03/2023

SCIENTIFIC PAPERS
Code: 36_4

Author Proof

Smart Road Infrastructures Through Vibro-Acoustic Signature Analyses

Rosario Fedele

Department of Information Engineering, Infrastructures and Sustainable Energy (DIIES), University Mediterranea of Reggio Calabria,
Via Graziella - Feo di Vito, snc, 89122 Reggio Calabria, Italy
rosario.fedele@unirc.it

Abstract. Smart cities need "intelligent" infrastructures designed or managed bearing in mind crucial characteristics, such as sustainability, efficiency, safety, and resiliency. Several solutions can be adopted, but the key factor for the success of the solution selected is its ability of improving the management process. The objective of the study described in this paper is to develop a solution that can be used to make smarter the road pavement monitoring and maintenance. In particular, a Non-Destructive Test (NDT)-based method is presented and applied aiming at extracting crucial information about the Structural Health Status (SHS) of the monitored road pavement. Results show that the method is able to recognize the presence and the growing of induced cracks using meaningful features extracted from the vibro-acoustic signatures (acoustic signals) of the road pavement loaded by a light vehicle. The above-mentioned features can be used to build innovative P-F curves able to improve the road pavement management process.

Keywords: Smart roads · Sustainability · Vibro-acoustic signature

Paper submitted to the 20th IEEE Mediterranean Elettronical Conference (MELECON), Palermo, Italy.
Issued on: June 2020
By: UNIRC
Deadline: 31/03/2023

SCIENTIFIC PAPERS
Code: 36_5

Acoustic Impact of Electric Vehicles

Filippo G. Praticò
Department of Information Engineering, Infrastructures, and Sustainable Energy (DIIES)
University "Mediterranea"
Reggio Calabria, Italy
filippo.pratico@unirc.it

Paolo G. Briante
Department of Information Engineering, Infrastructures, and Sustainable Energy (DIIES)
University "Mediterranea"
Reggio Calabria, Italy
0000-0002-0209-7024

Greta Speranza
Department of Information Engineering, Infrastructures, and Sustainable Energy (DIIES)
University "Mediterranea"
Reggio Calabria, Italy
0000-0002-2018-0198

***Abstract*— Electric vehicles (EV) diffusion depends on many factors among which policies, people options, and economic factors. Their noise-related performance could appear favourable. This notwithstanding, despite partisan opinions, the analyses carried out suggest that research and industry will have to minimise the collateral issues posed by a quite probable EV diffusion. The objective of the study presented in this paper is to analyse the acoustic impact of electric vehicles (EV) and to set up an overall framework for an effective management of their diffusion. After the objectives, EV overall characteristics are analysed. EV acoustic performance are then analysed. In the final discussion, the main characteristics of the required holistic approach are highlighted. This can benefit both researchers and practitioners.**

Keywords*— *Electric Vehicle, Noise, Surface Properties, Environmental Impact

Paper submitted to Forum Acusticum Congress "LIFE E-VIA project: noise, electric vehicles and tyres".

Issued on: November 2020

By: Comune di Firenze, Vie en.ro.se. Ingegneria

Deadline: 31/03/2023

SCIENTIFIC PAPERS

Code: 36_6

LIFE E-VIA PROJECT: NOISE, ELECTRIC VEHICLES AND TYRES

Arnaldo Melloni[1] Gessica Pecchioni[1] Sergio Luzzi[2] Raffaella Bellomini[2]

[1] Comune di Firenze, Firenze, Italy

[2] Vie en.ro.se Ingegneria srl, Firenze, Italy

gessica.pecchioni@comune.fi.it

ABSTRACT

The LIFE E-VIA project tackles noise pollution from road traffic noise focusing on a future perspective in which electric and hybrid vehicles will be a consistent portion of traffic flow. Others main objectives of the project consist in: the combination of knowledge of road optimization and tyre development in order to test an optimized solution for reducing noise in urban areas and Life Cycle Cost with respect to actual best; the noise reduction for roads inside very populated urban areas through the implementation of a mitigation measure aimed at optimizing road surfaces and tyres of EVs (electric vehicles). From a practical point of view, two road surfaces, and at least five different EVs (including tyres specifically designed for EVs) will be tested. Finally, the soundscape holistic approach will be used to evaluate the performance of EV vs ICEV in the newly built scenario.

LIFE18 ENV/IT/000201
With financial support from the EU LIFE programme

e-Forum Acusticum 2020
Dec 7-11, 2020

COMUNE DI FIRENZE

Vie en.ro.se. Ingegneria

LIFE E-VIA PROJECT: NOISE, ELECTRIC VEHICLES AND TYRES

Arnaldo Melloni, Gessica Pecchioni – Municipality of Florence (Italy)

Sergio Luzzi, Raffaella Bellomini – Vie en.ro.se Ingegneria s.r.l, Florence (Italy)

gessica.pecchioni@comune.fi.it

Video of the prototype construction

Issued on: December 2020

By: Université Gustave Eiffel

Deadline: 31/12/2021

VIDEO

Code: 8

LIFE E_VIA: Video of the prototype construction

https://youtu.be/awc5FhC72j4